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## (54) Conveyor belt

(57) A conveyor belt installation having a trough-shaped transport strand 11 enclosed by side and top panels 30 and 37 respectively to define a tunnel 41 for confining material carried by the transport strand 11 to prevent spillage and/or contamination by air-borne particles. The side panels 30 extend on opposed sides of the transport strand 11 and provide inclined support ledges 35 for the marginal edges of the transport strand 11 with strip members 36 arranged between the underside of the transport strand 11 and the support ledges 35 to seal the marginal edges and reduce wear of the transport strand 11. The panels 30, 37 are assembled in modular sections with a top panel 37 extending between a pair of opposed side panels 30 whereby any number of sections can be assembled to suit different lengths of transport strand 11. The invented arrangement for enclosing the transport strand 11 has application to new and existing installations.

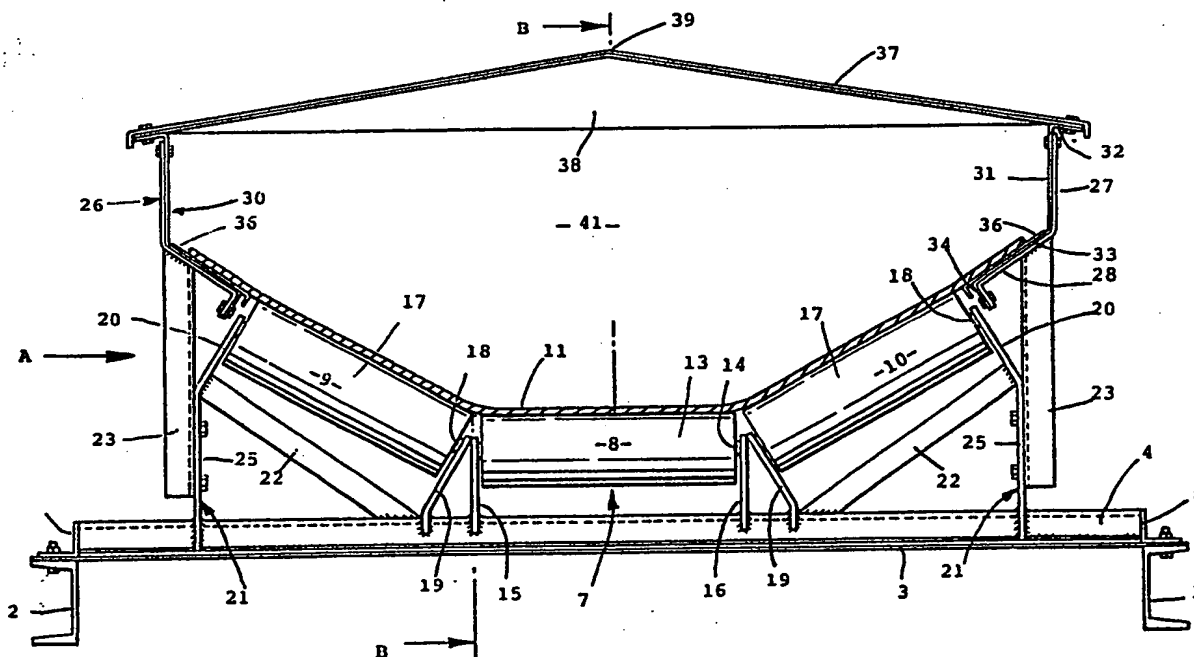


FIGURE 2.

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1982.

GB 2 234 482 A

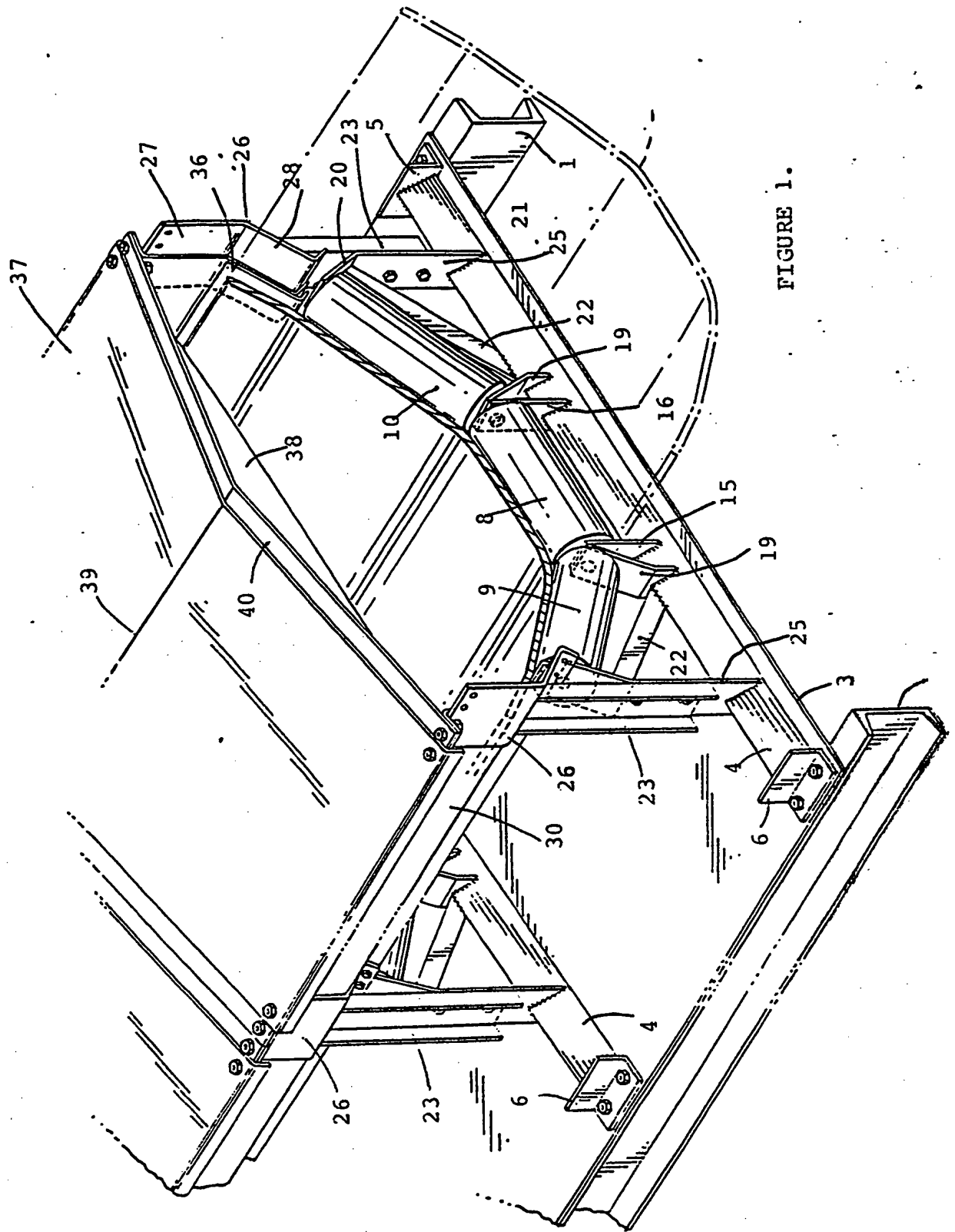
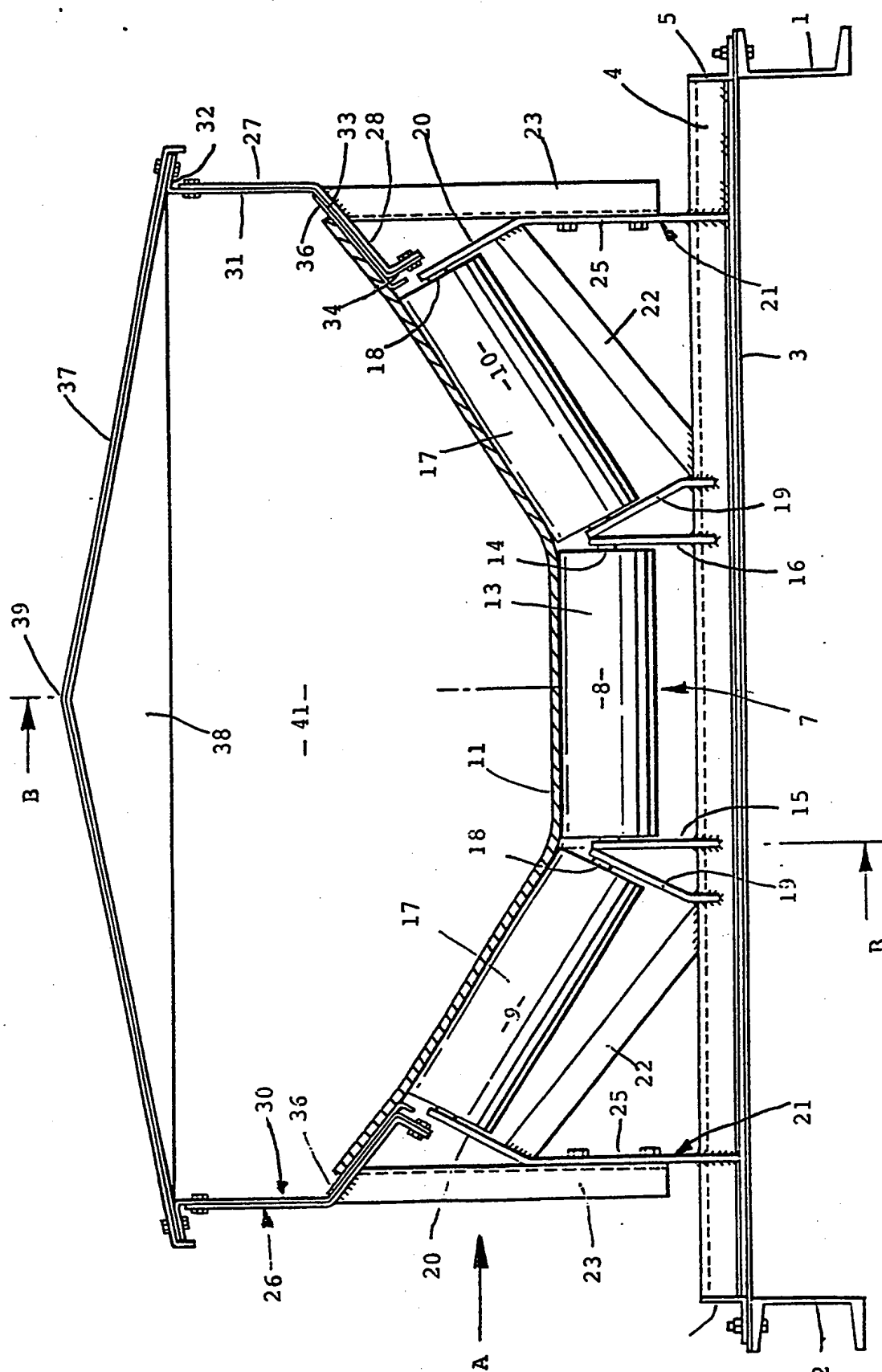


FIGURE 1.



**FIGURE 2.**

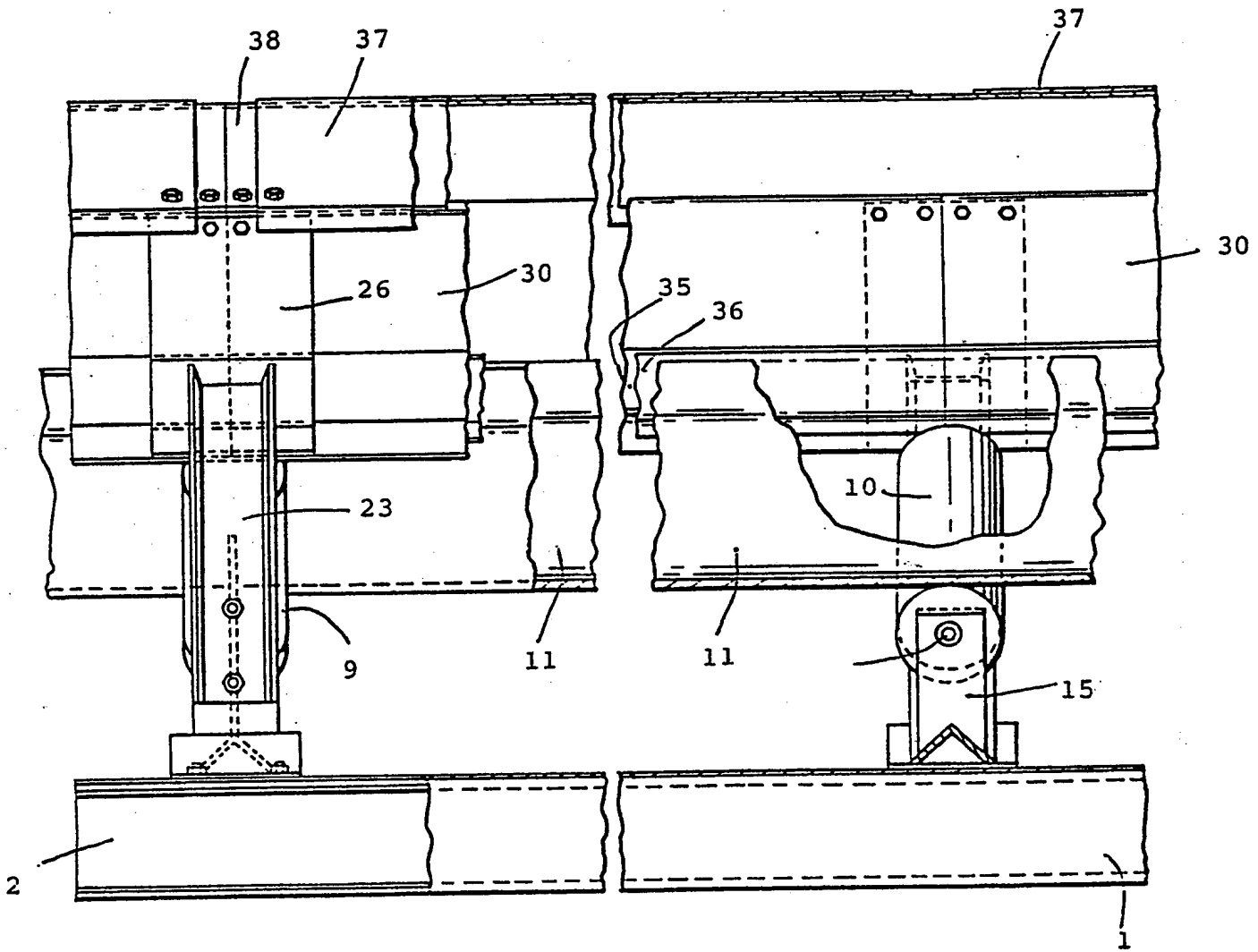


FIGURE 3.

FIGURE 4.

01 BELT CONVEYOR

This invention concerns belt conveyors that are commonly used for conveying bulk material such as sand, cement, flour, grain and other particulate or granular material to transport same from one location to another in a plant or installation.

It is already known to provide such belt conveyors in which the belt is supported so as to form a trough-shape so that the material is confined in the bottom of the trough whilst it is being carried by the conveyor belt.

Traditionally, such trough conveyor utilise a series of spaced apart roller sets to support the load supporting length of the belt, and these rollers define the trough-shape to which the belt material conforms.

Conventionally, in the conveyor, each roller set extends transverse to the direction of advancement of load supporting length of belt (the transport strand) whilst empty return length of belt (the return strand) merely runs underneath the transport strand with suitable guide or limited support rollers as may depend on the overall length of the return strand of the belt.

For the transport of particulate materials there are special problems which arise, and one of these is the way in which the material may be loaded onto the conveyor transport strand, and in some instances the loading is not done evenly so that the belt is overloaded and spillage can arise over the edges of the belt.

01        Another problem is that a belt conveyor  
system often has to transport materials of  
different volumetric density and volumetric  
05        weights, for instance, different grades of sand,  
or wet and dry sand. The load-weight carrying  
capacity of belt conveyors has to be carefully  
controlled, and often the original support  
structure cannot be modified or reinforced without  
great cost and disruption.

10        It is an object of this invention to provide  
a belt conveyor of the trough kind suitable for  
transporting such materials but providing  
advantages in operation and installation.

15        According to the broadest aspect of this  
invention, we provide in or for a conveyor  
installation comprising a belt having a transport  
strand supported so as to form a trough-shape, an  
arrangement for enclosing the transport strand.

20        Preferably, the centre section of the  
transport strand is supported in the required  
trough-shape by a series of longitudinally spaced  
apart transverse support members, for example  
rollers, and the marginal edges are supported by  
longitudinally extending support ledges.

25        Advantageously, the support ledges are  
inclined to extend the trough-shape and the  
inclination of the support ledges may be the same  
as or different from that of the support members.

30        Conveniently, the support ledges are provided  
by one or more side panels extending lengthwise of  
the installation on each side and one or more top  
panels extends between the side panels on opposed  
sides of the installation to enclose the transport  
strand.

01        Preferably, an elongate strip member is  
interposed between each support ledge and the  
underside of the marginal edge of the transport  
strand to provide a smooth support surface for  
05        sealing the edges of the belt and reducing wear.

Other features and advantages of the invented  
arrangement will be understood from the following  
description of an exemplary embodiment of the  
invention with reference to the accompanying  
10        drawings wherein:-

FIGURE 1 is a perspective view (partly broken  
away) of the arrangement for the transport strand  
of the belt in the conveyor;

FIGURE 2 is a sectional view across the  
15        transport strand of the belt in the conveyor as  
shown in Figure 1;

FIGURE 3 is a side view taken in the  
direction of the arrow A in Figure 2; and

FIGURE 4 is a further view of the transport  
20        strand of the belt in the conveyor taken in the  
direction B-B as shown in Figure 2.

With reference to the invented arrangement  
shown in the Drawings, the conveyor installation  
for conveying bulk material such as sand or the  
25        like particulate or granular material includes two  
opposed main support members 1,2 that extend  
substantially parallel and which would be mounted  
on rigid structure in known manner.

Support beams 3 extend between the support  
30        members 1,2 at spaced apart positions and each  
beam 3 carries a bearer rail 4 of inverted angle  
welded at each end to L-shaped brackets 5,6 bolted  
through the beam 3 at each end to the support  
members 1,2.

01        Each bearer rail 4 mounts a transverse roller  
set 7 comprising three similar rollers 8,9,10  
arranged to support the centre section of the  
transport strand 11 of a continuous belt 12 in a  
05        trough shape. The return strand (not shown) of  
the belt 12 would, in known manner, extend  
underneath or below the installation for empty  
return travel supported by any suitable means (not  
shown) as required.

10        The centre roller 8 comprises a right  
cylindrical roll 13 mounted for free rotation on  
an axial spindle 14 of which the opposed ends  
engage respective upright medial bearers 15,16  
welded to the bearer rail 4 to locate and support  
15        the centre roller 8 substantially horizontal and  
parallel to the bearer rail 4.

Each side roller 9,10 also comprises a  
respective right cylindrical roll 17 mounted for  
free rotation on a respective axial spindle 18 of  
20        which the opposed ends engage an angled medial  
bearer 19 and an angled upper part 20 of a side  
bearer 21 welded to the bearer rail 4 to locate  
and support each side roller 9,10 at the required  
inclination. A respective bracing strut 22  
25        extends between and is welded to each side  
bearer 21 and the bearer rail 4 adjacent to the  
associated angled medial bearer 19.

A respective side support 23 of channel-  
section is bolted to an upright lower part 25 of  
30        each side bearer 21 and has a support bracket 26  
welded to the upper end.

01        Each support bracket 26 has an upright side  
flange 27 and a downwardly inclined base flange 28  
terminating in a dependent bottom edge flange 29.  
The inclination of the base flange 28 is similar  
05    to that of the adjacent side roller 9,10 and the  
side support 23 is bolted on the side bearer 21 to  
position the base flange 28 generally in alignment  
with the upper support surface of the adjacent  
side roller 9,10.

10        On each side of the installation, the  
brackets 26 mount a respective series of similar  
side panels 30 each having an upright side wall 31  
terminating in an outwardly directed top edge  
flange 32 and a downwardly inclined base wall 33  
15    terminating in a dependent bottom edge flange 34.

Each side panel 30 extends between and is  
bolted at each end to two successive brackets 26  
with the side and base walls 31,32 seating against  
the side and base flanges 27,28 of the brackets 26  
20    and the respective dependent bottom edge  
flanges 29,34 abutting.

The assembled side panels 30 define, on each  
side of the installation, a continuous side wall  
and a continuous base wall with the base wall  
25    defining a support ledge 35 forming an extension  
of the trough shape of the roller sets 7. The  
opposed marginal edges of the transport strand 11  
extending beyond the roller sets 7 are supported  
on these support ledges 35 with a respective  
30    elongate strip member 36 interposed therebetween  
to provide a continuous seal along each lateral  
edge of the transport strand 11 and to reduce wear  
of the edges of the belt 12.

01       A series of top panels 37 extends between  
opposed pairs of side panels 30 and each top  
panel 37 has its transverse edges supported by  
05       respective spaced apart bridge members 38 bolted  
at each end to the respective top edge flanges 32  
of the opposed side panels 30.

Each top panel 37 is bolted at each end  
through the bridge members 38 to the respective  
top edge flanges 32 of the opposed side panels 30  
10       and is formed to provide a central apex 39 like a  
pitched roof with the bridge members 38 having  
inclined upper support faces 40 matching this  
pitched form.

As will now be appreciated, the central  
15       section of the transport strand 11 of the belt 12  
is supported in a trough shape by the roller  
sets 7, and the marginal edges are supported in an  
extension of the trough shape by the support  
ledges 35 provided on each side of the  
20       installation by the base walls 33 of the side  
panels 30 and are sealed on the underside by the  
strip members 36 positioned therebetween. The  
side panels 30 and top panels 37 totally enclose  
the transport strand 11 of the belt 12 and  
25       material loaded on the belt 12 is confined within  
the tunnel 41 formed by the belt 12, the side  
panels 30 and top panels 37. The edges of the  
transport strand 11 are in continuous sealing  
engagement with the strip members 36 and any  
30       material loaded on the transport strand 11 that is  
carried up the sides of the trough-shape cannot  
fall off the edges of the belt 12 and is confined  
within the tunnel 41. Similarly, any air born

01 fines or dust created by disturbance of the  
material is confined within the tunnel 41. As a  
result, spillage or contamination is avoided by  
the invented arrangement of the side and top  
05 panels 30,37 enclosing the transport strand 11.

It will be understood that the invented  
arrangement has application both for new original  
installations as well as for modifying or  
converting an existing belt conveyor to totally  
10 enclose the transport strand of the belt. For  
such modification or conversion, the side and top  
panels together with the bridge support members,  
the side support members and the strip members may  
be provided as a separate kit of parts for  
15 attachment to an existing installation and, if  
required, a wider belt provided to extend beyond  
the edges of the existing trough-shaped support  
means to engage the strip members for sealing the  
edges of the belt. In this way, not only is the  
20 transport strand of the belt totally enclosed as  
described above but the load carrying capacity of  
the installation is increased by the use of a  
wider belt thereby improving throughput and hence  
efficiency whilst retaining the essential support  
25 structure of the original installation.

As will be appreciated, the assembly of the  
side panels and top panels in sections bolted to  
the side supports enables the same basic  
components to be used for installations of  
30 different lengths. This has important advantages  
both for the manufacturer and for the user in  
reducing the number of components required.

01        It will be understood that the invented  
arrangement is not limited to the embodiment  
above-described. For example, the trough-shape  
imparted to the belt by the roller sets may be  
05        provided by any construction and arrangement of  
rollers or by any other suitable support means.

      The base walls of the side panels may be  
inclined at the same angle as the adjacent side  
rollers or at a different angle. For example, in  
10        the above embodiment, the inclination of the base  
walls and side rollers is substantially the same  
but the inclination of the base walls to the  
horizontal could exceed that of the side rollers  
to resist further the displacement of material  
15        loaded on the belt up the sides of the trough  
shape. Alternatively, the inclination of the base  
walls to the horizontal could be less than that of  
the side rollers where displacement of the  
material up the sides of the trough-shape is not a  
20        significant problem.

01 Claims:

1. In or for a conveyor installation comprising a belt having a transport strand supported so as to form a trough-shape, an arrangement of one or  
05 more side panels extending lengthwise of the installation on each side and one or more top panels extending between the side panels on opposed sides of the installation to enclose the transport strand.
- 10 2. An arrangement according to Claim 1 wherein the side panels provide respective support ledges extending lengthwise of the installation on each side for the marginal edges of the transport strand.
- 15 3. An arrangement according to Claim 2 wherein the support ledges are inclined to extend the trough shape.
4. An arrangement according to Claim 3 wherein the support ledges extend the trough shape at the  
20 same angle.
5. An arrangement according to Claim 3 wherein the the support ledges extend the trough shape at a different angle.
6. An arrangement according to any one of  
25 Claims 2 to 5 wherein an elongate strip member is interposed between each support ledge and the underside of the associated marginal edge of the transport strand.
7. An arrangement according to Claim 6 wherein  
30 the strip members provide a smooth support surface for sealing the edges of the belt and reducing wear.

- 01 8. An arrangement according to any one of the preceding Claims wherein support brackets for the side panels are provided on each side of the installation.
- 05 9. An arrangement according to Claim 8 wherein the side panels extend between and are releasably secured at each end to the support brackets.
- 10 10. An arrangement according to Claim 8 or Claim 9 wherein the support brackets are arranged at the upper ends of side supports detachably mounted on each side of the installation.
- 15 11. An arrangement according to any one of the preceding Claims wherein each top panel extends between opposed side panels and has its transverse edges supported by respective bridge members secured at each end to the opposed side panels.
- 20 12. An arrangement according to any one of the preceding Claims wherein the transport strand is supported in the trough shape by a series of longitudinally spaced roller sets each comprising a centre roller disposed between a pair of side rollers inclined upwardly and outwardly relative to the centre roller.
- 25 13. An arrangement according to any one of the preceding Claims wherein the side and top panels are adapted for assembly as modular sections each comprising a top panel and a pair of side panels.
- 30 14. In or for a conveyor installation comprising a belt having a transport strand supported so as to form a trough shape, an arrangement for enclosing the transport strand.
15. In or for a conveyor installation comprising a belt having a transport strand supported so as

- 01 to form a trough shape, an arrangement for  
enclosing the transport strand substantially as  
hereinbefore described with reference to the  
accompanying drawings.
- 05 16. A kit of parts comprising side and top panels  
for assembly in modular sections to enclose a  
trough-shaped transport strand of a conveyor belt  
wherein the side panels extend on opposed sides of  
the transport strand with the or each top panel  
10 extending between a pair of opposed side panels  
above the transport strand, and the side panels  
providing support ledges for the marginal edges of  
the transport strand with the support ledges being  
inclined to extend the trough shape of the  
15 transport strand, the arrangement being such that  
the side and top panels define with the transport  
strand a tunnel for confining material carried by  
the transport strand.